Applying Access Management to Development Site Reviews

Slides Applying Access Management to Development Site Reviews

Moderator: John Taber, Tabermatics, Inc.

Monday August 14, 2000 – 1:00 PM – 2:30 PM
Track 3 - Workshop

Applying Access Management in The Site Impact Review

4th Annual
Access Management Conference
Portland, OR August 2000

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All Aboard! - Let's Get Going

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Session 8
Site Design & Access Control

- Site Review Process
- Driveway Location Planning
- Driveway & Site Design
- Access Intersection Design
- Corridor Impacts

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Site Review Process

- Agency Approach
- The Concept Review
- Layout Alternatives

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Most Local Agencies Require Site Reviews for Proposed Developments

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Local Jurisdictions and State DOT's Have Different Agendas

State DOT	Local Jurisdiction
• Limit Access Pts.	• Economic Potential
• Arterial Performance	• Aesthetics
• Maintaining State Standards	• Local Access
	• Territorial Competition

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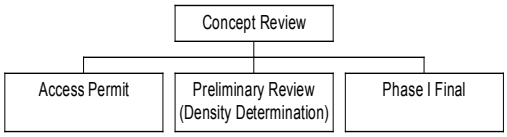
The Site Review Process Has Several Stages



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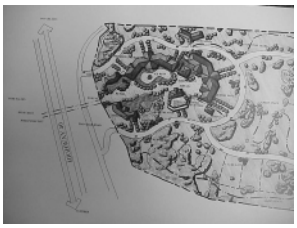
It's Critical To Get Involved At The Concept Plan Stage

- **Initial land use and access point determination**
- **No significant commitment yet with bankers, engineering**



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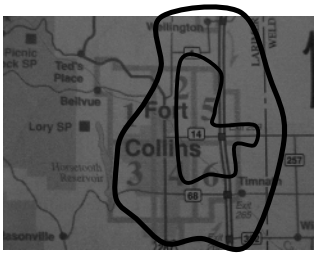
At The Concept Stage For Commercial Sites, Show The Improved Market Area w/ Access Control



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Issues Best Addressed at The Concept Stage

- **No. of Access Points**
- **Location of Access Points**
  - **(Functional Areas, Intersection Spacing, Turn Restrictions)**
- **Access Permit**
- **Impact Fees**
- **Potential Intersection Control**
- **Inter-Connects, Driveway Sharing**

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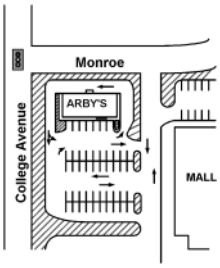
Look At Alternatives: Internal Corner Pods, Side Road, Back Access



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Access Control From Internal Pods Can Beautify The Corridor

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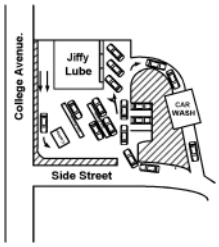
Side Roads, Back Access Are Great For Serving Locals



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Rear Parking and Store Entrances Can Relieve Traffic On-Site

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Site Traffic Can Be Worked Around The Environment

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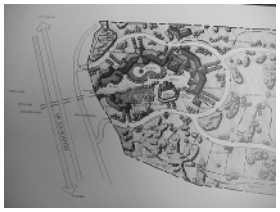
Get Involved Early !

- This is the Time!
- Too Late!



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Now We're Gaining Steam

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Issues in Driveway Planning (at early stage)

- No. of Access Points
- Driveway Locations
- Trip Generation
- Trip Distribution
- Interconnects

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Driveway Planning Example

210,000 ft² Wal-Mart
Fri, p.m. peak hr.
Arterial: 35,000 ADT

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Rough Planning Calculations

Trips: 210 x 42.92 = 9,013
@ 10% for peak hr: 901
@ 50% out: 450

Arterial: 35,000 @ 10% for peak: 3500
@ 4-lanes: 875/lane, sat flow=1200/ln
need: 80% of green (incl. lost)

Driveway: assume sat. flow = 900/hr./ln.
@ 20% of 90 sec cycle (15 sec.): 180/lane
Lanes reqrd. = 3 out, 2-3 in

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Check Corner Clearances (Your Mileage May Vary)

Minor Collector: 30 mph ~150 ft.
Res. Collector: 35 mph ~325 ft.
Major Collector: 40 mph ~525 ft.
Minor Arterial: 45 mph ~660 ft.
Major Arterial: 50 mph ~1320 ft.

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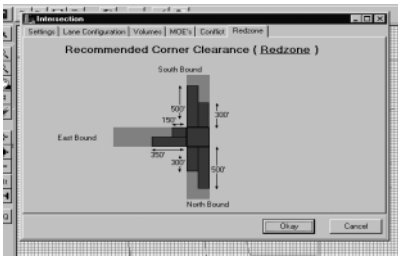
Corner Clearances Can Be Illustrated With the "Red-Zone" Concept



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Entrances Should Get Traffic In Quickly - Away From Collector

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The Sign Message Illustrates The Poor Flow Pattern

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Trip Generation Issues

- Whenever Possible, Compare to Similar Nearby Sites
- Trucks Should Be Considered, at Least As Auto Equivalents
- Carefully Evaluate Mixed-Use Trips
- Must Count By-Pass Trips in Internal Roadway & Access Intersection Design
- Is It Really Transit Accessible?

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Is It Really Transit Accessible?

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Approximate Distribution - Perform Distribution Sensitivity (ie. 20%, 30%, 40% Left Turns)

- Population Density
- Commercial Density
- Existing Similar Facilities
- Gravity Model, Reilly's Competing Retail

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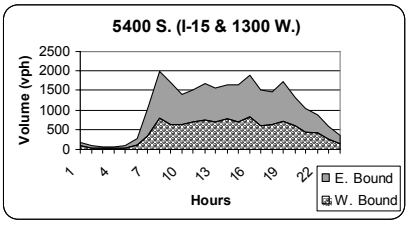
Get Accurate Data Hourly Distribution, By-Pass (They May Be Different Than Expected)



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Approximate Nearby Future Growth

- Design Year
- Adjacent Zoning
- Consider Special Service District

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Non-Shared, Separate Driveways Result in More Arterial Conflicts

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Interconnections Between Sites Are Critical For Minimizing Driveway Intersections But Require Good Traffic Flow Paths


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Rolling Along

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Elements of Driveway & Site Design

- Good Ingress/Egress
- Throat Depth
- Sight Distance
- Turn Lanes
- Drive-ins
- Pedestrian/Bike Access
- Service (Delivery, Emergency) Access

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Entrances/Exits Should Be Well-Placed and Be Coordinated To Traffic Patterns

This is the main entrance for traffic from the right, yet the driveway is faced the wrong way.

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Entrances/Exits In "Red Zone" Create Dangerous Conflicts

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Deep Gutters Can Slow Entrance Speeds - Creating Sudden Stops


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Hard To Read Signs At Entrance Can Cause Stopping on Street

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Well Spaced, Well Signed Entrances Minimize Driver Slowdowns on Corridor

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Sign is Highly Visible Yet Non-Obtrusive

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Entrances Should Be Intuitive - Can Also Be Attractive

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Throat Distance is Measured Between Roadway and 1st Parking Stalls or Internal Drive

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Inadequate Throat Distance Can Back Up to Main Road

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Parking Stalls Should Not Back Into Collector Streets

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Throat Distance Must Allow For Projected Intersection Queues

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Poor Delineation of Driveways Also Affects Throat Operations

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Landscaped Driveway Medians Add Throat Depth & Are Attractive

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Good Throat Depth Allows Decisions Away From Arterial

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Even With a Frontage Road, Throat Distance Can Be a Problem

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Frontage Roads Can Be Re-aligned To Increase Clearance

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Sight Distance Is Too Often Ignored In Site Impact Reviews (Especially Vertical)

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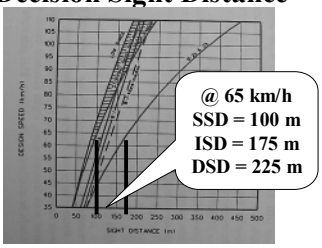
Minimum Safe Stopping Distance vs. Intersection Sight Distance vs. Decision Sight Distance



Source: AASHTO, 1994

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Signal Box, Sign Can Block Sight Distance Along High Speed Arterial

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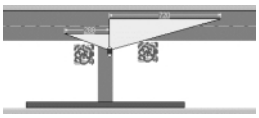
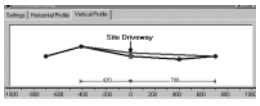
Both Horizontal & Vertical Sight Triangles Should Be Checked





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Combined Vertical & Horizontal Curves Create Problems

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Turn Lanes Should Be Clearly Marked And Intuitive

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Double Entrance Lanes Minimize Queue Spillbacks to Arterial

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Exit Lanes Should Be Matched To Both Internal and External Intersection Calculations

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Time For a Drink Break

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Avoid Excessive Curbing Around Entrance & Exit Points

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Excessive Curbing or Obstacles Will Lead to Slower Ingress Speeds or Stops on the Corridor

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Sufficient Drive-in Stacking Distance Avoids Spilling Out Onto Adjacent Roadways

Good !

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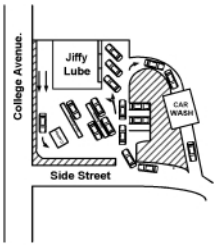
Poor Site Layout Can Spill Traffic Onto Adjacent Streets



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A Better Layout of The Same Land Use Keeps Queues On-Site

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Basic Queueing Equations

N = No. of Svc. Positions

q = Arrival Rate

Q = Service Rate (inverse of service time)

Coeff. Of Util. = q / (NQ)

Queue Storage = $\frac{(\ln P(x>M)-\ln E(w) >0)}{\ln p}$

Source: Koepke, Stover
Transportation & Land Development

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McDonald's Backup

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Car Wash Exits Have Acceleration Length, Sight, and Icing Issues

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Avoid Major Movements Across Pedestrian Crossings

Provide Well-Defined Crossings and Vehicle Traffic Stopping Points


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Pedestrian Crossing Into School Site With Signal

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Use of Cobble Stones & Stop Sign For Pedestrian Access Into Site

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Bike Racks on Sidewalk Are Out of Vehicle Harm's Way


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Pedestrian/Bike Paths Must Make Sense If They Are To Be Used

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Busy Service Points (ie. Trash) Should Not Interfere With Main Entrance

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Truck Maneuvers Should Not Occur on Major Roadway

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Loading Docks Should Allow Maneuvers Out of Traffic Flow

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Dumpster Out of The Way of Main Access Driveway

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Elements of Intersection Design

- Functional Distance
- Turn Bay Design & Warrants
- Median Openings
- Channelization
- Control Devices
- Conflicts

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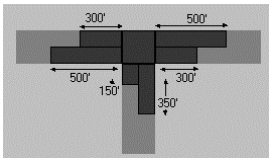
Intersection Functional Distance

- Includes:
  - Deceleration
  - Lateral
  - Queuing
- Entering & Leaving
- TRR 1100 (Stover)



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Turn Bays Should Be of Sufficient Width For Lateral Transition

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Right-Turn Bays Must Consider Any Existing Bike Lanes

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Left Turn Bays Slow Traffic in Passing Lane - Design For High Speed

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Offset Left-Turn Bays Improve Sight Distance For Turning Vehs.

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Median Openings Need Adequate Stacking Room

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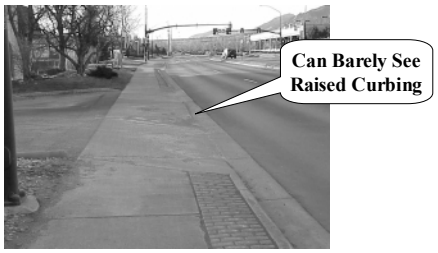
Avoid Unnecessary Channelization



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Painted Channelization Can Be Highly Effective in Same Direction

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Attractive Channelization

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Uh !

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Carefully Evaluate <u>All</u> Options For Driveway Control Devices

- **Yield (Right-in, Right-out)**
- **Stop**
- **"Pork Chop"**
- **4-Way Stop**
- **Roundabout**
- **Actuated Signal**

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Right-In, Right-Outs With Bay Avoid Most Conflicts But Increase U-Turns

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"Pork Chop" Channelization Can Separate Conflicts

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Where Most Movements Are Thru, 4-Way Stops Are Highly Efficient

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Roundabouts Can Handle High Volumes of Turning Conflicts

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Roundabouts Must Consider Truck Movements

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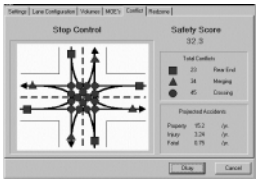
Intersection Design Should Consider Conflicts

- **Measure Types**
  - **Conflict Points**
  - **Projected Conflicts**
  - **Projected Accidents**



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Coming Around the Bend

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Corridor Impacts of Site Development

- **Signal Spacing**
- **Median Design**

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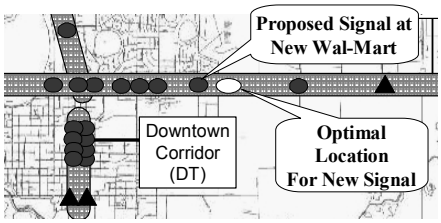
Even Signal Spacing Requires Driveways to Match a Perfect Grid System - A Rarity!



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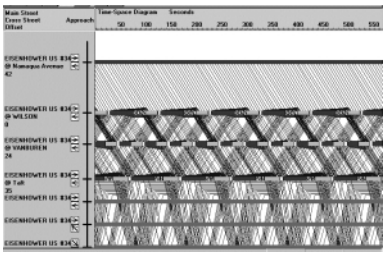
Check Signalized Site Driveways To Maintain Corridor Bandwidth



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Though Warranted, Poorly Spaced Signals Can Cause Gridlock

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Median Design Should Be Corridor-Wide, Not on an Intersection Basis

- **Maintain Consistency & Driver Expectancy**
- **Median Types**
  - **Undivided**
  - **TWLTL**
  - **Raised**
  - **Jersey Barrier**

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Several Good References for Median Designs

- **NCHRP 420**
- **Florida Median Design Manual**

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Undivided Medians Result in Stopped Traffic, Swerving Alignment

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Two-Way Left-Turn Lanes Allow Maximum Flexibility Into & Out Of Sites

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Raised Medians Can Increase Safety and Capacity

- Creates Additional U-Turns
- Provides for Pole Locations & Landscaping
- May Limit Direct Access From One Direction

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Site Access with Raised Medians Can Have Alternative Designs

- Completely Closed (Right In - Right Out)
- Left In
- Left Out

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Completely Closed Medians Require U-Turns for Site Traffic

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Left-In Median Openings Allow Site Traffic To Easily Get In Without the Left Out Conflicts

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We're Not Just Blowing Smoke

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Why is Access Management So Important At Site Review Time

- Access Control is Only as Good as The Weakest Link
- Access Control Can Increase Capacity 20-40%
- Access Control Can Increase Safety
- 20-40%

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Have a Check List

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Key Points To Remember

- **Get Involved At Concept Stage**
- **Put Effort Into Good Driveway Location Planning**
- **Design Good Ingress, Egress**
- **Lots of Alternative Intersection Designs**
- **Arterial Impacts = Signal Spacing, Medians**

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Hope You Enjoyed Today's Journey Now Get Out There & Do It !

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